

CHAPTER 3

Air Quality

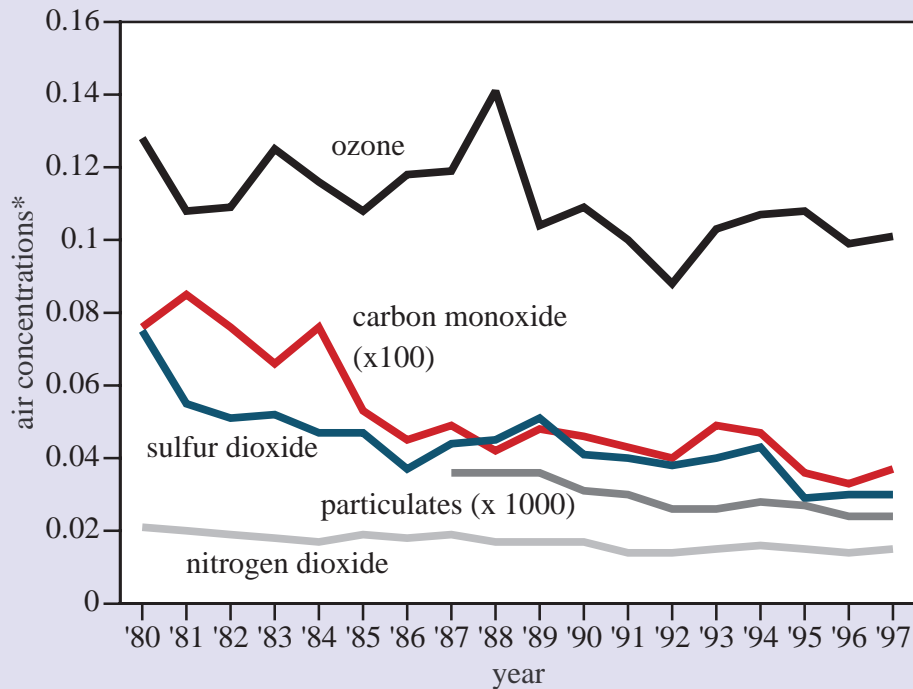


Indicator 1: Ambient Air Concentrations

Figure 1

Air Concentrations of Criteria Pollutants in Kentucky

*Concentrations from state monitored sites based on the following: ozone: averaged second maximum, one-hour standard. CO: second maximum eight-hour average. NO_x and particulates (PM₁₀): annual statewide averages. SO₂: second maximum, 24-hour average. Concentrations in parts per million for all pollutants except particulates, which are measured in micrograms per cubic meter. Source: Ky. Div. for Air Quality



BACKGROUND

The federal Clean Air Act (CAA) of 1970, along with modifications in 1977 and amendments in 1990, has significantly improved the quality of air Kentuckians breathe. The CAA specifies controls for six criteria pollutants: ozone, nitrogen oxide, carbon monoxide, sulfur dioxide, particulates and lead. These pollutants can cause serious threats to human health and ecosystems and consequently have been the primary focus of federal and state air pollution programs.

The Kentucky Division for Air Quality operates a network of 98 monitoring stations in 34 counties. The Jefferson County Air Pollution Control District operates an additional network of 27 monitors. These stations provide data used to evaluate compliance with ambient air quality standards. EQC also uses this information to track yearly average concentrations of air pollutants in Kentucky and assess trends.

SOURCE

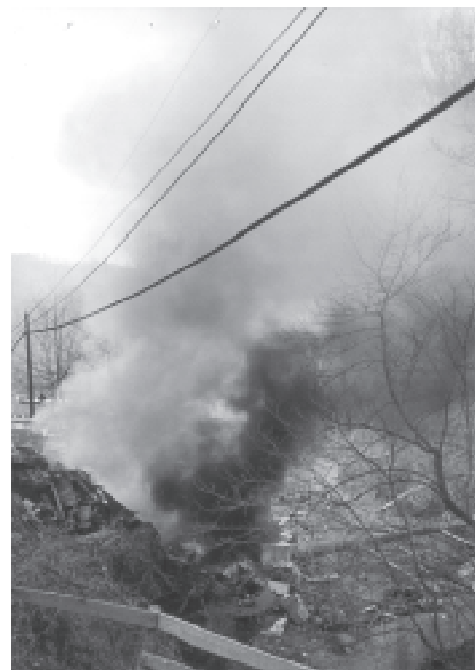
There are numerous sources of air pollution including point (i.e. smokestack), mobile (i.e. automobile exhaust), and area sources (i.e. dust from roads) in Kentucky.

GOAL

Ensure ambient air is safe to breathe.

PROGRESS

Since 1980, Kentucky, as well as the nation, has witnessed significant improvements in air quality. Pollution controls on industrial sources and automobiles have resulted in a statewide trend of declining average air concentrations of criteria pollutants. However, trends reveal that these reductions have leveled off in recent years.

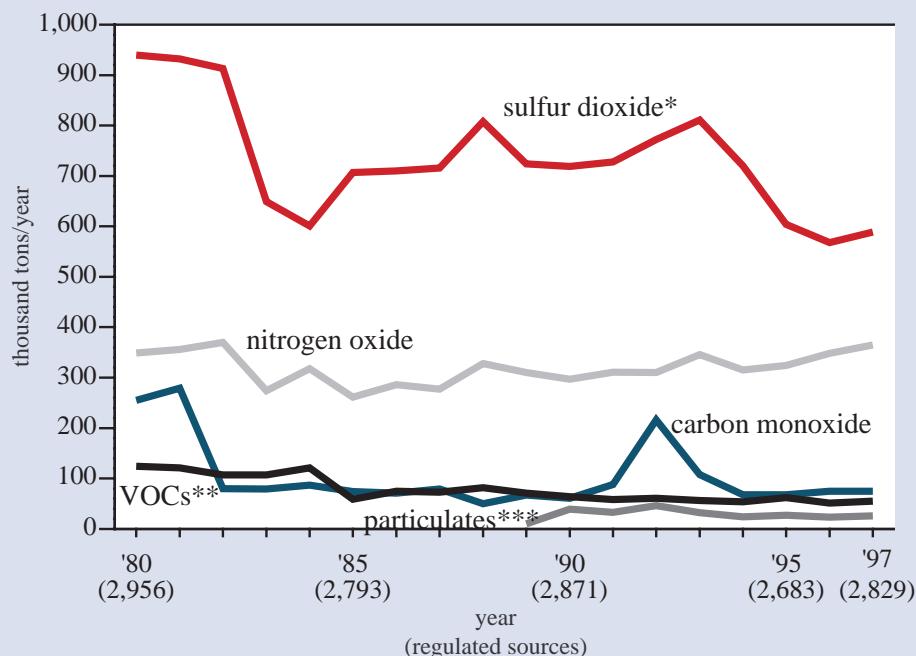


Indicator 2: Industrial Air Emissions

Figure 2

Air Emissions from Regulated Sources in Kentucky

Note: Excludes Jefferson County data because the Air Pollution Control District was unable to provide data for years prior to 1990.
 * Decline in SO₂ emissions in 1983-84 may have been due to closure of TVA power plant for repairs and installation of scrubbers.
 ** 1980-88 VOC data represent total hydrocarbons. *** PM₁₀ data collection began in 1989. Source: Ky. Division for Air Quality



BACKGROUND

Reducing emissions of various pollutants consequently aids in reducing the concentrations of these pollutants in the air. This indicator tracks industrial emissions of criteria pollutants.

SOURCE

The Kentucky Division for Air Quality (DAQ) and the Jefferson County Air Pollution Control District (JCAPCD) regulate point, mobile, and area sources of air pollution in the state. DAQ regulates 1,878 permitted, 310 registered and 641 other sources of air pollution. JCAPCD regulates 790 permitted and 536 registered sources. Nearly 290 facilities are major sources, emitting 100 tons or more of air pollutants each year.

GOAL

Limit emissions of air pollutants to levels that meet air quality standards and prevent unacceptable risks to human health or the environment.

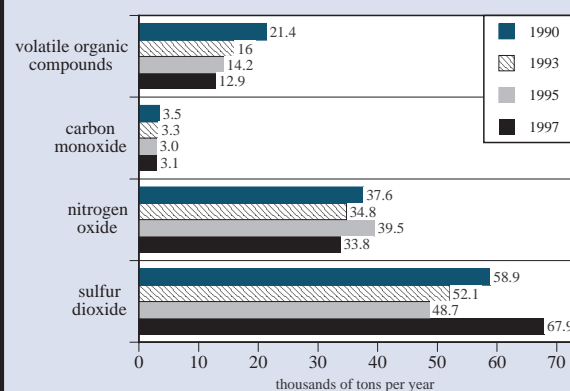
PROGRESS

Environmental controls have reduced emissions released by regulated sources resulting in lower ambient air concentrations of many of the criteria air pollutants. For example, statewide air emissions (excluding Jefferson County where 1980 data is not available) of sulfur dioxide fell from 940,000 tons in 1980 to 589,000 tons in 1997, carbon monoxide emissions declined from 255,000 tons in 1980 to 75,000 tons in 1997, and volatile organic compounds dropped from 124,000 tons in 1980 to 55,000 tons in 1997. The decline in industrial emissions has since leveled off in recent years.

Figure 3

Industrial Emissions of Air Pollutants from Regulated Sources in Jefferson Co.

Note: Earlier data not available.
 Source: Jefferson County Air Pollution Control District

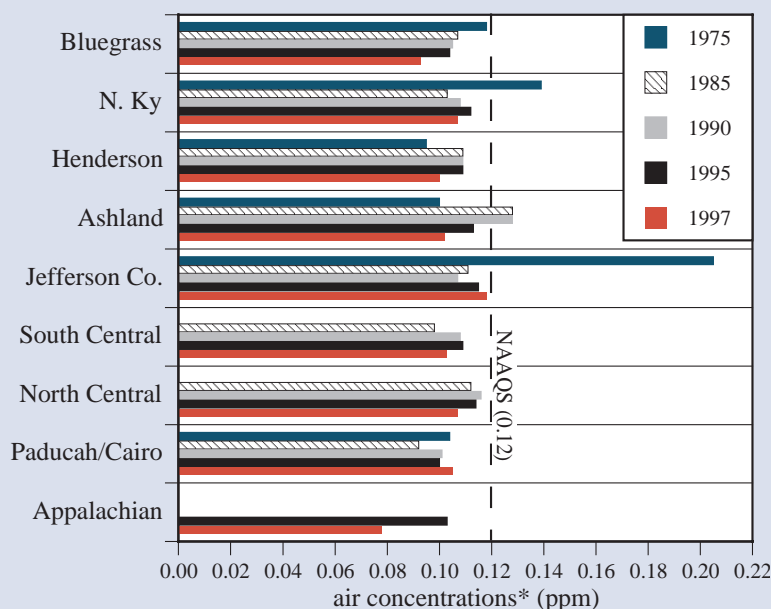


Indicator 3: Ground-Level Ozone

Figure 4

Regional Air Concentrations of Ozone

*Note: Selected years. Some regions were not monitored for all years. *Ozone air concentrations based on averaged second maximum, one-hour standard recorded at state-monitored sites within each region. Concentrations compared to the National Ambient Air Quality Standard (NAAQS). ppm-parts per million.*
Source: Ky. Division for Air Quality



BACKGROUND

Although ozone acts as a protective layer high above the earth, ground-level ozone, a main ingredient in smog, can be harmful to human health. Breathing ground-level ozone, above the health-based standards, is known to cause chest pain, coughing, and may worsen bronchitis, heart disease, emphysema, and asthma. Healthy people can also experience breathing problems when exposed to high levels of ozone. Currently, 771,875 Kentuckians, or 19.8% of the population, live in areas not meeting the one-hour 0.12 ppm ozone standard. Significantly more Kentuckians are living in areas that will likely fail to meet a new federal eight-hour 0.08 ppm ozone standard. The Kentucky Division for Air Quality is currently monitoring air quality across the state to determine compliance with the new standard.

SOURCE

Ground-level ozone is formed when volatile organic compounds (VOCs) such as chemical solvents, gasoline vapors, and oxides of nitrogen (NO_x), a by-product of combustion, react with sunlight. High ozone levels are most prevalent during the summer months when the air is hot and stagnant. Winds can also transport ozone and ozone precursors to downwind areas, exacerbating ground-level ozone. During 1997, area sources emitted 147,697 tons, onroad mobile emitted 93,502 tons, nonroad mobile emitted 37,653 tons, and regulated point sources emitted 67,900 tons of VOCs. Air Products and Chemicals in Marshall County led the state with 9% (6,181 tons) of the statewide regulated VOC emissions followed by Toyota Motors Manufacturing (3,264 tons), and ISP Chemicals (2,080 tons).

GOAL

Implement and enforce requirements to meet the ozone standard (0.12 parts per million averaged over one hour) as required by federal and state law. Adopt new measures designed to reduce regional transport of ozone and achieve the new ozone standard (0.08 parts per million averaged over eight hours) by 2007.

PROGRESS

Kentucky was among 30 states and the District of Columbia that violated the national one-hour ozone pollution standard between 1995-1997. The greatest number of ozone standard exceedances in Kentucky occurred during the hot summers of 1980, 1983, and 1988. Technologies to control VOC emissions, such as catalytic converters on automobiles, have led to a decrease in the number and severity of ozone standard

Figure 5**Number of Days with One or More Ozone Standard Exceedances, by Air Quality Control Region**

	Bluegrass	N. Ky.	Henderson	Ashland	Jefferson	Paducah	N. Central	S. Central	Appalachian
1980	0	10	1	4	23	1	1	0	NM
1981	1	0	2	0	5	1	0	0	0
1982	0	1	0	3	4	0	0	0	0
1983	2	7	4	8	19	2	3	0	0
1984	0	1	0	7	11	0	0	0	NM
1985	0	1	1	3	1	0	0	0	NM
1986	3	1	2	3	2	2	3	0	NM
1987	2	3	2	8	6	0	2	1	NM
1988	5	15	12	12	7	5	12	5	NM
1989	0	1	0	1	4	0	0	0	NM
1990	1	0	3	4	1	0	2	0	NM
1991	0	0	0	3	0	0	2	0	NM
1992	0	0	0	0	0	0	0	0	0
1993	0	1	0	1	2	1	1	0	0
1994	0	0	2	2	1	0	0	0	0
1995	0	1	0	1	2	0	1	0	2
1996	0	1	0	0	2	0	0	0	0
1997	0	0	0	1	1	0	3	0	0

Note: Based on number of days in Kentucky that had one or more exceedances of one-hour ozone standard as recorded at state air quality monitors. NM-not monitored. Source: Ky. Division for Air Quality

exceedances in Kentucky. Most regions of the state have met the 0.12 parts per million (ppm) one-hour ozone standard, and the U.S. EPA has declared that this standard no longer applies to these areas. The Louisville ozone nonattainment area (Jefferson and portions of Bullitt and Oldham counties and the southern Indiana counties of Floyd and Clark), however, has not yet achieved that standard and therefore remains subject to it.

Although exceedances of the one-hour 0.12 ppm ozone standard have been declining in the Kentucky portion of the ozone nonattainment area, the region is still in violation and measures must be taken to address the problem. Ozone control measures in effect in the Louisville area include vehicle emissions testing, reformulated gasoline,

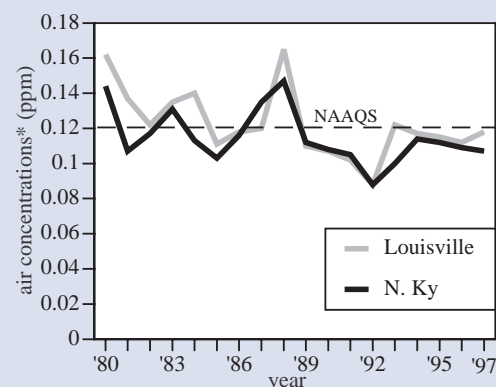
and pollution controls on all major and many minor industrial and commercial sources. In 1997, the Jefferson County Vehicle Emissions Testing (VET) Program inspected 443,045 vehicles. Of that total, 35,040 vehicles were retested after initially failing the test and 7,050 vehicles ultimately failed the test. The county granted 606 waivers to vehicles that did not pass the test. In April 1998, a tougher VET program went into effect with the goal of reducing vehicle emissions another 2 million pounds per year.

Recently, the U.S. EPA determined that air quality standards for ozone were not sufficient to protect human health. The agency reduced the concentration of ozone allowed in the air from 0.12 ppm to 0.08 ppm. The new standard is averaged over eight hours rather than one hour used by the existing standard. It is estimated that 16 counties in Kentucky will have difficulty meeting the new ozone standard, based on historical monitoring data.

In response to the Clean Air Act and the new ozone standard, Boone, Kenton, and Campbell counties will begin a Vehicle Emissions Testing Program in late 1999 to help reduce ozone concentrations. Approximately 236,000 vehicles will be tested every two years.

Figure 6**Louisville and Northern Kentucky Ozone Air Concentrations**

*Ozone concentrations based on averaged second maximum, one-hour standard recorded at state-monitored sites. ppm-parts per million. Source: Ky. Div. for Air Quality

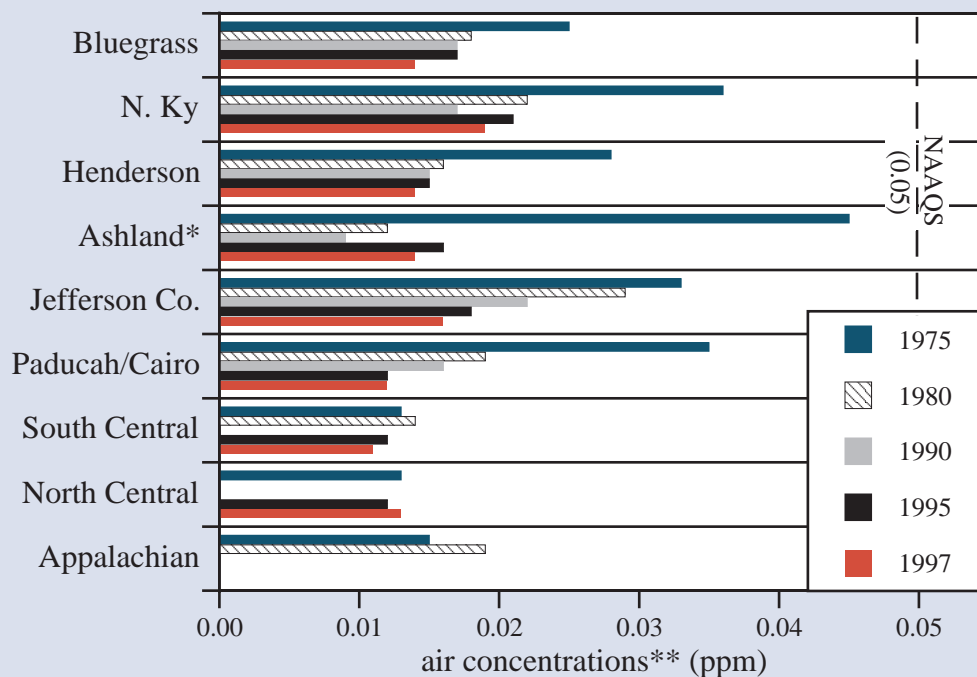


Indicator 4: Nitrogen Dioxide

Figure 7

Regional Air Concentrations of Nitrogen Dioxide

Note: Selected years. Some regions not monitored for all years. * There is no explanation for the 1990 increase in the air concentration average in the Ashland region. This may be due to monitoring changes in the region that year. ** Yearly average NO_x concentrations at state-monitored sites. Concentrations compared to the National Ambient Air Quality Standard (NAAQS). ppm-parts per million. Source: Ky. Division for Air Quality



BACKGROUND

National ambient air quality standards limiting the amount of nitrogen dioxide in the air were established because high concentrations are known to impair human health. Nitrogen oxides also combine with water to form acids and contribute to the formation of acid rain and ground-level ozone.

SOURCE

Nitrogen dioxide (NO_2) belongs to a family of highly reactive gases called nitrogen oxides (NO_x)—a brownish mixture produced by fossil fuel combustion from sources such as cars and power plants. During 1997, area sources emitted 74,728 tons, onroad mobile 135,793 tons, nonroad mobile 81,420 tons, and regulated point sources emitted 398,800 tons of NO_x . That year, power plants accounted for 84% of the regulated NO_x emissions. The TVA-Paradise power plant in Muhlenberg County led the state with 32% (128,418 tons) of the statewide NO_x regulated emissions followed by TVA-Shawnee power plant (34,617 tons), and Kentucky Utilities-Ghent power plant (28,540 tons).

GOAL

Implement and enforce requirements to meet the national standard of 0.05 ppm for nitrogen dioxide, the 1990 Clean Air Act Amendments which specify large NO_x sources, such as power plants, modify combustion processes to reduce NO_x emissions 30% to 40% below 1980 levels by the year 2000 as part of the Acid Deposition Control Program, and NO_x emission limits that were also imposed by the U.S. EPA in 1998 to help reduce ozone pollution.

PROGRESS

Air concentrations in all regions of the state remain below the national standard for NO_2 . While several individual power plants



Figure 8**Nitrogen Oxide Emissions from Power Plants in Kentucky**

N/A - not operating. *1990-97 comparison.
Comparison made between 1980-95.
Source: Ky. Division for Air Quality,
Jefferson County Air Pollution Control
District, Utility Information Exchange

County	Facility	1980 tons	1990 tons	1997 tons	1980-97 % change
McCracken	TVA - Shawnee	32,065	25,349	34,612	+7.9%
Muhlenberg	Ky. Utilities - Green	2,873	4,162	1,986	-30.9%
Muhlenberg	TVA - Paradise	127,451	97,787	128,418	+0.8%
Ohio	W. Ky. Energy - Wilson	N/A	6,355	6,367	+0.2%*
Daviess	OMU*	14,855	10,871	14,419	-2.9%
Hancock	W. Ky. Energy - Coleman	23,790	14,696	7,337	-69.2%
Henderson	Henderson Mun. Power	292	160	193	-34.3%
Webster	W. Ky. Energy - Reid	10,736	9,839	6,030	-43.8%
Webster	W. Ky. Energy - Green	5,940	8,292	6,837	+15.1%
Boone	Cinergy - East Bend	N/A	11,442	7,998	-30.1%*
Carroll	Ky. Utilities - Ghent	20,226	22,980	28,540	+41.1%
Bell	Ky. Utilities - Pineville	216	204	241	+11.6%
Clark	E. Ky. Power - Dale	1,692	2,481	4,897	+189.4%
Clark	E. Ky. Power - Smith	N/A	N/A	21	N/A
Fayette	Ky. Utilities - Haeffling	28	26	.6	-97.9%
Mercer	Ky. Utilities - Brown	12,046	11,319	7,130	-40.8%
Woodford	Ky. Utilities - Tyrone	449	518	477	+6.2%
Lawrence	Am. Elec. Power - Big Sandy	N/A	25,249	22,860	-9.5%*
Mason	E. Ky. Power - Spurlock	N/A	12,090	16,246	+34.4%*
Pulaski	E. Ky. Power - Cooper	3,177	6,594	7,382	+132.4%
Jefferson	LG&E - Mill Creek	16,391	19,475	19,475	+18.8%
Jefferson	LG&E - Cane Run	14,333	8,674	7,420	-48.2%
Trimble	LG&E - Trimble	N/A	2,166	7,650	+253.2%*
Total	23	286,560	300,729	336,537	+17.4%

in Kentucky have reduced NO_x emissions, total statewide nitrogen oxide emissions released from power plants increased by 17.5% between 1980 and 1997.

Kentucky is one of 22 Midwestern states that must reduce the amount of NO_x emitted from coal-burning power plants and other sources under a new U.S. EPA rule. Nitrogen oxides, precursors to ground-level ozone, emitted from sources in the Midwest travel as far away as the Northeast, making it difficult for that region to meet federal ozone standards, according to the U.S. EPA. Kentucky and 21 other states will be affected by the new rule which is intended to reduce NO_x emissions by 1.1 million tons per year in the eastern U.S. by the year 2003. The new rule calls for reducing NO_x emissions from electric generating units in Kentucky by 66%. The plan also specifies reductions from other large industrial boilers of 60%, large cement kilns of 30%, and large stationary internal combustion engines of 90%. Kentucky will be responsible for emission cut-backs of 75,000 tons per ozone season (May through September).

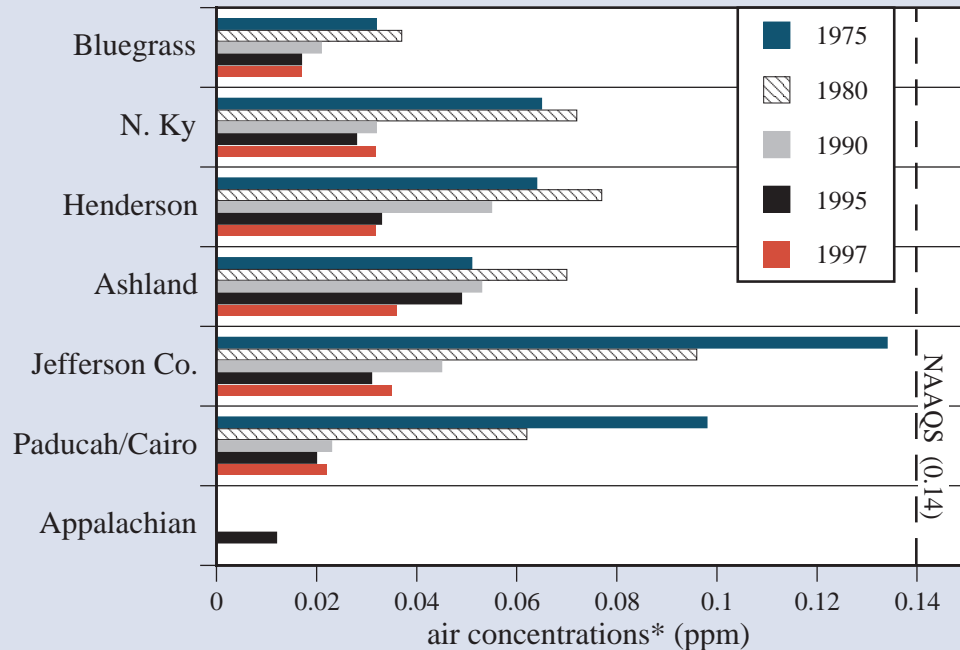


Indicator 5: Sulfur Dioxide

Figure 9

Regional Air Concentrations of Sulfur Dioxide

Note: Selected years. Some regions not monitored for all years.
 * Yearly concentrations based on second maximum 24-hour averages of SO₂ at state-monitored sites. Concentrations compared to the National Ambient Air Quality Standard (NAAQS). ppm-parts per million. Source: Ky. Division for Air Quality



BACKGROUND

Sulfur dioxide is a pungent, colorless gas that can cause respiratory illness and aggravate existing cardiovascular disease. Certain populations are particularly sensitive to sulfur dioxide including children, the elderly, asthmatics, and individuals with chronic lung disease. Sulfur dioxide can also damage the foliage of trees and agricultural crops and is a major precursor to acid rain.

SOURCE

Sulfur dioxide (SO₂) is formed when fuel containing sulfur is burned. During 1997, stationary sources emitted 57,201 tons, onroad mobile 5,677 tons, nonroad mobile 26,056, and regulated point sources emitted 656,900 tons of SO₂. That year, coal-fired power plants accounted for 91% of the regulated SO₂ emissions. TVA-Paradise power plant led with 28% (187,099 tons) of the statewide regulated SO₂ emissions followed by American Electric Power-Big Sandy power plant (72,945 tons), and Kentucky Utilities-Ghent power plant (53,303 tons).

GOAL

Implement and enforce requirements to meet the national ambient air quality standard of 0.14 ppm for sulfur dioxide and the requirements of the 1990 Clean Air Act Amendments which specify a 40% reduction in SO₂ emissions by the year 2000, using 1980 as the baseline, as part of the Acid Deposition Control Program.

PROGRESS

Since the 1970s, the number of regions in Kentucky not attaining the SO₂ standard has dropped from seven to zero. The National Ambient Air Quality Standard for sulfur dioxide is being met throughout Kentucky, although the southern portion of Boyd County has not yet been redesignated as attainment.

Ongoing efforts by power plants to curb SO₂ emissions, as part of the 1990 national Acid Deposition Control Program, have likely contributed to the declining SO₂ air concentrations in some regions of the state. Total sulfur dioxide emissions from power plants in Kentucky fell 42.2% between 1980 and 1997 while the amount of coal burned at these plants increased 22.8% (from 31.1 million tons in 1980 to 38.2 million tons in 1997). Of the

Figure 10

Sulfur Dioxide Emissions from Power Plants in Kentucky

*Utilities affected under Phase II of the National Acid Rain Reduction Program. N/A-not operating. Source: Ky. Division for Air Quality, Jefferson County Air Pollution Control District, U.S. EPA, LG&E

County	Facility	1976 tons	1980 tons	1997 tons	1980-97 % change
McCracken	TVA - Shawnee*	288,000	86,961	35,001	-59.8%
Muhlenberg	Ky. Utilities - Green River*	27,000	13,529	16,305	+20.5%
Muhlenberg	TVA-Paradise*	456,000	372,654	187,099	-49.8%
Ohio	W. Ky. Energy - Wilson*	N/A	N/A	7,961	N/A
Daviess	OMU*	74,000	45,159	7,687	-82.9%
Hancock	W. Ky. Energy - Coleman*	100,000	78,650	46,822	-40.5%
Henderson	Henderson Mun. Power*	9,000	1,526	1,271	-16.7%
Webster	W. Ky. Energy - Reid*	81,000	53,443	10,239	-80.8%
Webster	W. Ky. Energy - Green*	N/A	7,618	2,329	-69.4%
Boone	Cinergy - East Bend*	N/A	N/A	12,307	N/A
Carroll	Ky. Utilities - Ghent*	76,000	84,553	53,303	-36.9%
Bell	Ky. Utilities - Pineville*	1,000	467	539	+15.4%
Clark	E. Ky. Power - Dale*	8,000	3,929	7,639	+94.4%
Clark	E. Ky. Power - Smith	N/A	N/A	4	N/A
Fayette	Ky. Utilities - Haeffling	5	5	<1	-99.4%
Mercer	Ky. Utilities - Brown*	57,000	53,153	32,544	-38.7%
Woodford	Ky. Utilities - Tyrone*	2,000	1,081	863	-20.2%
Lawrence	Am. Elec. Power Big Sandy*	60,000	61,617	72,945	+18.4%
Mason	E. Ky. Power - Spurlock*	NA	19,322	30,956	+60.2%
Pulaski	E. Ky. Power - Cooper*	35,000	12,743	15,629	+22.6%
Jefferson	LG&E - Mill Creek*	112,039	107,491	48,380	-55.0%
Jefferson	LG&E - Cane Run*	109,578	32,904	16,090	-51.1%
Trimble	LG&E - Trimble*	NA	NA	13,720	N/A
Total	23	1,495,622	1,036,805	599,049	-42.2%

state's 23 power plants, 13 have reduced sulfur dioxide emissions between 1980-1997.

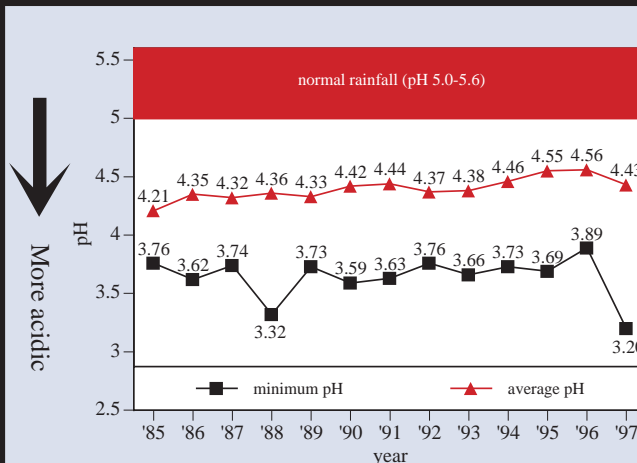
Several power plants have met the 40% reduction goal including TVA Shawnee, Owensboro Municipal Utilities, West Kentucky Reid and Green, East Ky. Power-Spurlock, Louisville Gas and Electric Mill Creek and Cane Run. Additional SO₂ reductions are slated for the year 2000 as part of Phase II of the national Acid Deposition Control Program.

Kentucky's rainfall has become less acidic over the years, possibly due to the reduction of sulfur dioxide emissions. Data from monitoring stations in three Eastern Kentucky counties reveal that the average pH of rainfall has become less acidic in the past 12 years. However, in 1997, rainfall pH was more acidic than in the previous year. The drop in pH in 1997 is attributed to meteorological events, such as low rainfall levels that year, according to officials at the National Atmospheric Deposition Program.

Figure 11

Average pH of Rainfall at Monitored Sites in Kentucky

Note: Volume-weighted averages from monitored sites in Washington, Letcher, and Rowan counties. pH is a measure of acidity or alkalinity of a solution. Source: National Atmospheric Deposition Program, Illinois State Water Survey

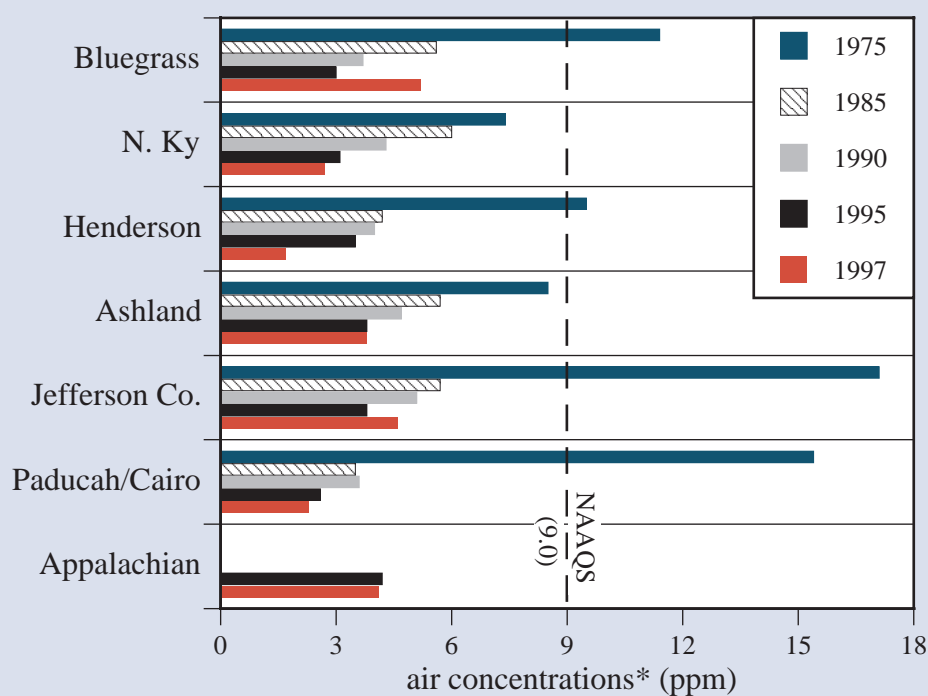


Indicator 6: Carbon Monoxide

Figure 12

Regional Air Concentrations of Carbon Monoxide

Note: Selected years. Some regions not monitored for all years.
 *Yearly concentrations based on second maximum eight-hour averages of CO at state-monitored sites. Concentrations compared to the National Ambient Air Quality Standard (NAAQS). ppm-parts per million. Source: Ky. Division for Air Quality



BACKGROUND

Carbon monoxide (CO) is a colorless, odorless gas formed when the carbon in fuel is not burned completely. Carbon monoxide may cause serious health problems, including dizziness and slowed reflexes, when the standard is exceeded. At very high levels, CO is poisonous and can lead to death.

SOURCE

Vehicle exhaust accounted for 62% of CO emissions in Kentucky during 1997, with the remainder generated from industrial processes and fuel combustion sources. During 1997, area sources emitted 160,227 tons, onroad mobile emitted 909,123 tons, nonroad mobile emitted 234,607 tons, and regulated point sources emitted 78,100 tons of CO. That year, Alcan Ingot and Recycling in Henderson County led the state with 32% (25,193 tons) of statewide regulated CO emissions followed by Westvaco Corporation (7,981 tons), and National Southwire Aluminum (6,364 tons).

GOAL

Implement and enforce requirements to meet the national standard of 9.0 ppm for carbon monoxide using various emission control programs and technologies.

PROGRESS

All regions of the state currently meet the CO standard. CO air concentrations continue to decline or remain unchanged with the exception of the Bluegrass and Jefferson County regions. Declines are attributed to pollution controls on automobiles. The Ashland area in Boyd County has had periodic exceedances of the carbon monoxide standard.

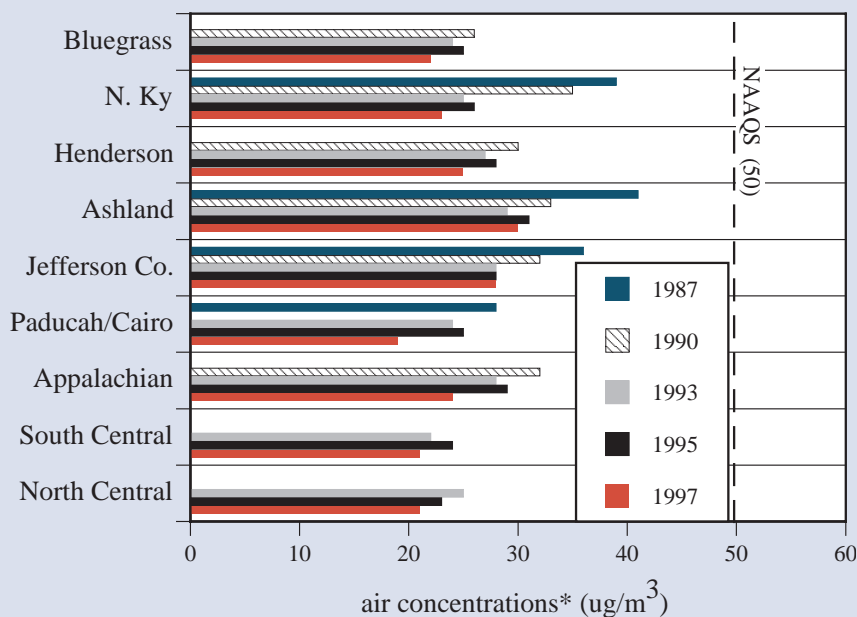


Indicator 7: Particulates

Figure 13

Regional Air Concentrations of Particulates (PM₁₀)

Note: Selected years. Some regions not monitored for all years.
 * Yearly concentrations based on PM₁₀ averages at state-monitored sites. Concentrations are compared to the National Ambient Air Quality Standard (NAAQS), ug/m³-micrograms per cubic meter.
 Source: Ky. Division for Air Quality



BACKGROUND

Particulates are small particles of dust, dirt, chemicals, and soot in the air. Concerns regarding the impacts of particulates on public health prompted the U.S. EPA to issue a PM₁₀ standard in 1987 to control particulates 10 microns or smaller. Health effects from exposure to PM₁₀ include breathing and respiratory problems, cancer, and premature death. The elderly, children, and people with chronic lung disease are especially sensitive to particulate matter. In 1997, the U.S. EPA issued new health-based standards for particulates less than 2.5 microns in diameter. Based on new health studies, these smaller particulates can be inhaled more deeply into the lungs than PM₁₀ particulates, making the new standard more protective of human health. Many of these small particles are chemicals that condense from gaseous emissions, such as nitrates from oxides of nitrogen and sulfates from sulfur dioxide. New PM_{2.5} particulate monitors will be located in 18 counties and will begin monitoring in 1999.

SOURCE

Particulates are emitted from cars, construction sites, mineral and metal processes, coal-fired power plants, agricultural operations, and roads. During 1997, area sources emitted 164,577 tons, onroad mobile sources emitted 131,394 tons, nonroad mobile emitted 8,211 tons, and regulated point sources emitted 26,000 tons of PM₁₀ (excluding Jefferson County where regulated source data is not available). That year, Pinnacle Processing Inc. in Martin County led the state with 14% (3,669 tons) of the statewide regulated PM₁₀ emissions followed by National Southwire Aluminum (1,601 tons), and AK Steel (1,135 tons).

GOAL

Implement and enforce requirements to meet the national PM₁₀ standard of 50 micrograms per cubic meter for particulates and the new federal air quality PM_{2.5} standard for particulate matter less than 2.5 microns in diameter using various emission control programs and technologies.

PROGRESS

Air monitors began measuring particulates based on the PM₁₀ standard in 1987. All regions of the state currently meet the PM₁₀ standard. By the end of 1999, 22 new PM_{2.5} monitoring stations in 18 counties will begin measuring compliance with the new standard.

Indicator 8: Enforcement

BACKGROUND The Kentucky Division for Air Quality (DAQ) is the principal agency responsible for monitoring and implementing clean air regulations in the state. In addition, Air Pollution Control District of Jefferson County (JCAPCD) was created in 1952 and was approved by the U.S. EPA in 1970 to implement the provisions of the Clean Air Act for the county and metropolitan Louisville.

SOURCE DAQ currently regulates 2,829 industrial and commercial sources of air pollution while JCAPCD regulates 790 facilities and 536 service stations. During 1997, more than 5,000 inspections at permitted facilities were conducted to ensure compliance with permits and regulations.

GOAL Ensure air is safe to breathe by enforcing air quality regulations, permits, and agreed orders.

PROGRESS In 1997, 907 violations of air quality rules were cited by DAQ (405 at permitted facilities, 436 at area sources, and 66 asbestos violations). JCAPCD issued 90 air quality notices of violation in 1997 (65 at permitted facilities and 25 for open burning, asbestos and other sources).

Some of the violations cited are the result of complaint investigations. In 1997, more than 2,000 air quality complaints were received by regulatory agencies. Thirty-nine percent of these complaints concerned odors. Many violations cited by DAQ are resolved at the regional office level without the assessment of penalties but some violations result in formal referral to the Central Office for penalty assessment. In 1998, penalties were assessed by the state against 58 industrial facilities, seven commercial contractors, five individuals, and two schools. DAQ also works to resolve violations through the use of Supplemental Environmental Projects (SEPs). During 1997, 17 SEPs were entered into by responsible parties to mitigate \$1.2 million in penalties. Recent projects included the placement of ads in newspapers regarding open burning, pollution prevention measures, and the installation of pollution control and other equipment beyond what is required by state regulations.

Figure 14

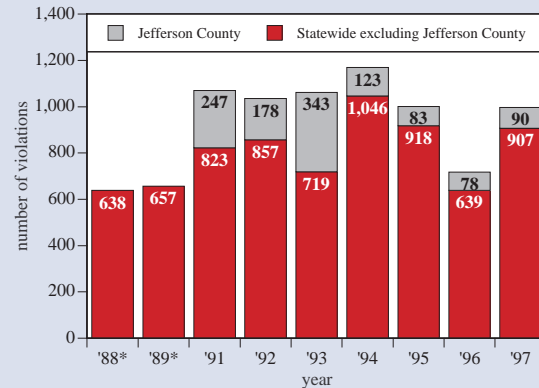
Air Quality Enforcement Indicators

Note: 1990 state data unavailable due to computer problems.

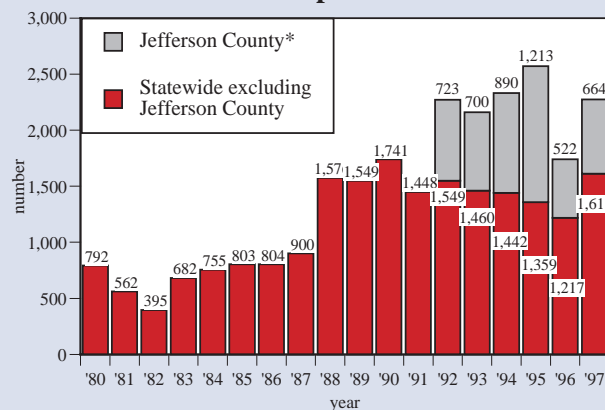
*Jefferson County data not available for all years.

N/A-Data not available. **Federal fiscal year. Source: Ky. Division for Air Quality, Jefferson County Air Pollution Control District

Violations Cited



Complaints



Penalties

Year	State(\$)	Jeff. Co.(\$)**
1990	126,500	N/A
1991	1,698,375	N/A
1992	N/A	282,000
1993	847,425	377,000
1994	366,650	N/A
1995	976,500	80,000
1996	1,208,247	35,000
1997	507,450	45,000
1998	850,431	N/A

Indicator 9: Indoor Air Quality

BACKGROUND U.S. EPA studies have found that indoor levels of many pollutants may be two to five times, and on occasion more than 100 times, higher than outdoor levels. These levels are a concern since most people spend as much as 90% of their time indoors. Over the past decade, exposure to indoor air pollutants has increased due to a variety of factors, including the more tightly sealed buildings, reduced ventilation to save energy, the use of synthetic building materials and furnishings, and the use of chemically formulated cleaning and other products.

SOURCE There are many sources of indoor air pollution including the combustion of fuels such as oil and gas, tobacco smoke, building materials such as asbestos-containing insulation and wet carpets, fumes from household cleaning products, central heating and cooling systems, and outdoor sources such as radon and pesticides. The relative importance of any one source depends on how much pollutant is emitted and how hazardous that emission is.

GOAL Ensure air is safe to breathe by reducing exposure to indoor air pollution through education and awareness.

PROGRESS A major indoor air quality threat in Kentucky is radon. Radon is a known human lung carcinogen. It is a colorless, odorless, gas that occurs naturally and can enter homes through cracks in foundations. The U.S. EPA recommends that all homes be tested for radon. Data from Air Chek, a national radon testing firm, reveal that 40% of the 27,977 homes tested in Kentucky since 1985 had radon levels above 4.0 pico Curies per liter, the health advisory limit set by the U.S. EPA. The highest levels were in Wayne, Hart, Warren, Meade, and Nelson counties. Data is not available to determine how many homes have been mitigated to reduce radon levels.

Several activities have been initiated to reduce exposure to radon including amending the state building codes to specify radon-resistant construction, promoting radon testing and disclosure, and a school testing and mitigation program initiated by the Kentucky Department for Public Health.

Secondhand tobacco smoke is an indoor air pollutant that can contribute to eye, nose, and throat irritation, lung cancer, and heart disease. Kentucky has the nation's highest smoking rate among adults at 32%, according to the U.S. Department of Health and Human Services. The Kentucky Department for Public Health has targeted a smoking rate of no more than 23% of the state's adult population by the year 2000.

Figure 15

Indoor Air Radon Levels in Kentucky

Note: Based on 27,977 radon tests conducted from 1986-1998. 4.0 pico Curies per liter is the health advisory limit established by the U.S. EPA.
Source: Air Chek, Inc.

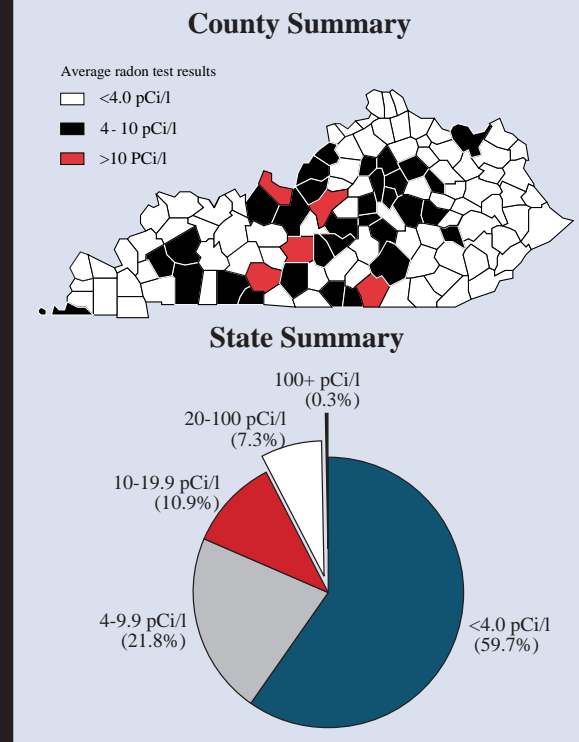
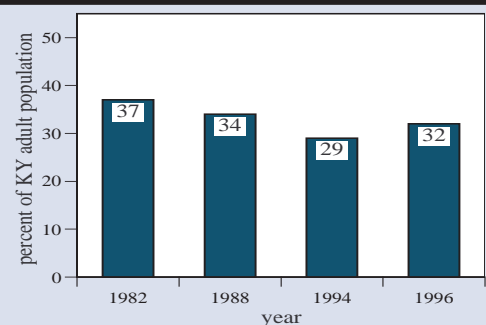


Figure 16

Cigarette Smoking Prevalence Among Adults 18 and Over in Ky.

Source: U.S. Department of Health and Human Services



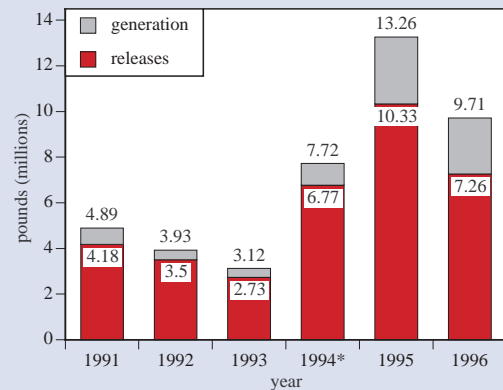
Indicator 10: Ozone-Depleting Chemicals

BACKGROUND The earth's stratospheric ozone layer protects against the sun's harmful ultraviolet (UV) rays, but human activities have damaged this shield. While ozone concentrations vary naturally, scientists have found that the ozone shield is being depleted well beyond changes due to natural processes. A diminished ozone layer allows more radiation to reach the earth's surface. For people, overexposure to UV rays can lead to skin cancer, cataracts, and weakened immune systems. Increased UV can reduce crop yields and disrupt the marine food chain.

Figure 17

*Note: Chemical transfers are those chemicals transferred for treatment or recycling. *Chemical releases and transfers of four new chemicals required to be reported in 1994. Source: Toxics Release Inventory Reports, U.S. EPA*

Generation of Ozone-Depleting Chemicals from Industries in Ky.



SOURCE

In the early 1970s scientists began investigating the effects of various chemicals on the ozone layer, particularly chlorofluorocarbons (CFCs), which contain chlorine. CFCs are used as refrigerants, solvents, and blowing agents. Other chlorine-containing compounds include methyl chloroform, a solvent, and carbon tetrachloride, an industrial chemical. When CFCs reach the stratosphere, the radiation from the sun causes them to break apart and release chlorine atoms which react with ozone, starting the chemical cycle of ozone destruction. Similarly, when halons (fire extinguishing agents) and methyl bromide (a soil fumigant) are broken apart, they release bromine atoms, which are 40 times more destructive to ozone molecules than chlorine atoms.

GOAL

Phase out production of CFCs and other ozone depleters as specified in the Montreal Protocol Treaty.

PROGRESS

In 1978, the use of CFC propellants in spray cans was banned in the U.S. In 1987, the Montreal Protocol was signed to protect the earth from the detrimental effects of ozone depletion. Since that time, the treaty has been amended to ban CFC production after 1995 in developed countries and later in developing nations. Currently, 167 countries have signed the treaty.

Data from the 1996 Toxic Release Inventory report reveal that 21 companies in the state released 7.25 million pounds of 14 ozone-depleting chemicals. Kentucky ranked top in the nation in on-site releases of ozone depleters that year. Two companies—DuPont and Elf Atochem—accounted for 84% of the total ozone-depleting releases in Kentucky.

The generation of certain ozone depleting chemicals in Kentucky is declining. For example, CFC-12 emissions fell from 621,930 pounds to 37,030 pounds between 1991 and 1996. The use of methyl bromide, a soil fumigant used primarily in the production of tobacco in Kentucky, declined 61% between 1991 and 1997 (from 1.15 million pounds to 431,789 pounds). Three ozone depleters accounted for 92% of the reported 1996 air releases in Kentucky (HCFC-142b, HCFC-22, and HCFC-141b).

Figure 18

Top 10 Ky. Companies Releasing Ozone Depleters to the Air

Note: Based on 1996 data. Source: Toxics Release Inventory, U.S. EPA

Company (County)	Pounds
DuPont, Louisville Plant (Jefferson)	3,907,778
Elf Atochem N.A., Inc. (Marshall)	2,226,870
U.S. Enrichment Corp. (McCracken)	317,000
Topy Corp. (Franklin)	176,750
GE Appliance (Jefferson)	123,600
Lordon Co., Inc. (Jefferson)	123,170
Firestone Building Prod. (Kenton)	105,016
Olin Corp. (Meade)	68,718
Jideco of Bardstown (Nelson)	51,655
Okonite Co. (Madison)	45,400
Total top 10	7,145,957
Total state	7,257,430